Fish Survey Report

Lake Woodland

Submitted to:

Woodland Springs H.O.A.

5702 Kirkpatrick Way

Indianapolis, IN 46220

Submitted by:

Aquatic Control, Inc.

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Introduction

A survey of the fish community and other physical, biological, and chemical factors directly affecting the fish community was completed at Lake Woodland on October 13, 2021. The major objectives of this survey and report are:

1. To provide a current status report on the fish community of the lake.
2. To compare the current characteristics of the fish community with established indices and with past surveys on Lake Woodland.
3. To provide recommendations for management strategies to enhance or sustain the sport fish community.

Water Chemistry

When managing an aquatic ecosystem the quality of water should always be considered first. If a lake or pond is perfectly constructed with abundant food and habitat, but has poor water quality, the fishery will ultimately suffer and never reach it's full potential. Although oxygen is typically not a year-round issue there are certain situations that can cause oxygen to drop to detrimental levels. If parameters such as pH or alkalinity are too low or too high it can put tremendous stress on the organisms living in it or even create a toxic environment all together. Other important parameters to consider are nitrogen and phosphorus levels. Nitrogen and phosphorus are two major nutrients that drive the plant growth in an aquatic ecosystem. If the ratio of nitrogen to phosphorus is below 17:1 there is potential for blue-green algae to become abundant. These species of algae can create a stressful environment for fish due to disruption of the food web.

Table 1. Selected lake and water quality parameters.

	Surface	Ideal Range
Acres	46.24	-
Temperature (F)	71.1	-
Dissolved Oxygen (ppm)	8.94	5.0+
pH	8.2	6-9
Alkalinity (ppm)	116	20+
Total Hardness (ppm)	114	20+
Total Phosphorus (ppm)	0.14	0.01-0.09
Total Nitrogen (ppm)	1.76	1.0-10.0

The results of selected physio-chemical parameters from Lake Woodland report are presented in Table 1. Dissolved oxygen, pH, alkalinity, and hardness levels were all in acceptable ranges. The lake had relatively uniform temperature and dissolved oxygen throughout the water column (Figure 1). The nitrogen to phosphorus ratio is 13:1 on the surface. This indicates there is potential for abundant blue-green algae growth during warmer months of the year. Overall, water quality parameters indicate Lake Woodland appears to be capable of supporting a healthy fish population.

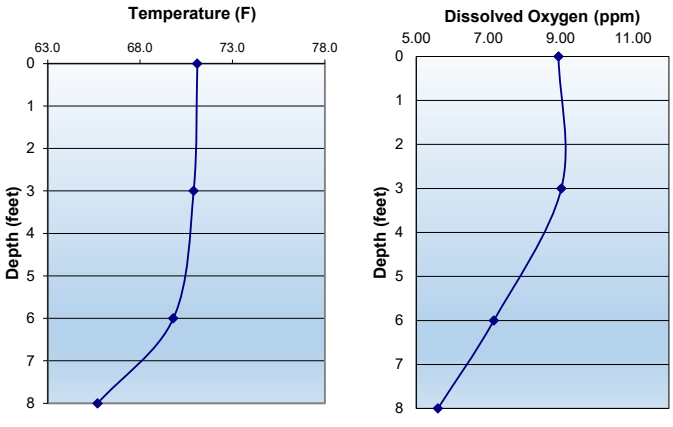

Figure 1. Temperature and Dissolved Oxygen profiles.

Lake Woodland

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Fish Collection

Fish sampling was done with the use of an electrofishing boat. Electrofishing is simply the use of electricity to capture fish for the evaluation of population status. Electrofishing equipment used in this survey consisted of a 16-foot aluminum boat equipped with a Midwest Lake Electrofishing Systems Infinity Box powered by a 6500-watt portable generator and two booms mounted with Wisconsin style rings. Electrofishing was done around the entirety of the shoreline and totaled one hour of shocking.

All fish collected were placed in water filled containers aboard the sampling boat for processing. Each fish collected was measured to the nearest half-inch. Five fish in each half-inch group were weighed to determine average and relative weights. Relative weight is a condition factor used to determine the overall plumpness of an individual fish. Relative weight values from 90-100 indicate good condition while anything under 90 is considered in poor condition. It can be assumed that fish with higher relative weights are finding enough food and are growing at a higher rate than fish with a lower relative weight.

A total of 767 fish weighing 183.84 pounds and representing eleven species was collected from Lake Woodland. The relative abundance of these species can be found in figure 2 and a full data table can be found at the end of this report. The data collected are adequate for management implications; however, there will be unanswered questions regarding aspects of the fish population and other related factors of the biological community in the lake. All fish numbers used in the report are based on the samples collected and should not be interpreted to be absolute or estimated numbers of fish in the lake.

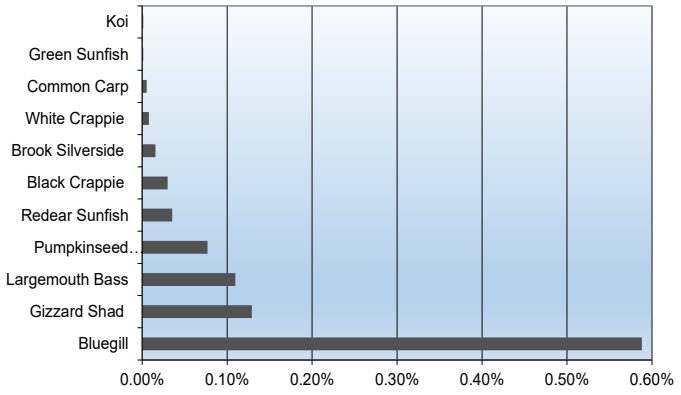

Figure 2. Relative abundance of species collected.

Largest Largemouth Bass caught during survey.

Largest White Crappie caught during survey.

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Predator-Prey Relationship

Even the most diverse systems can be broken down into predator-prey relationships. Often times the Largemouth Bass-Bluegill relationship is the most important. Bluegill are a great prey item for Largemouth Bass because they spawn multiple times a year and are continually creating food for Largemouth Bass. Managing for one species typically involves influencing both and as one of these populations change the other typically changes with it. In a balanced state both Largemouth Bass and Bluegill can experience proper growth rates.


Bluegill

Lake Woodland—Bluegill

Bluegill ranged in size from less than 3.0 to 7.0 inches (Figure 3). Approximately 62% of Bluegill collected were 3.0 inches or less, indicating successful reproduction occurred in 2021. There was a small number of quality Bluegill collected. This led to a proportional stock density (PSD) of 27, which is within the desired range of 20-40 for Bluegill (proportion of quality fish within a population). The relative weight values of Bluegill collected at Lake Woodland ranged from 74 to 102 (Figure 4). Low overall relative weights and the lack of high quality individuals likely indicates Bluegill are overabundant and stunted.

A high level of competition for resources and an inadequate level of predation has led to slow growth rates in Bluegill. This is quite common in impoundments that have Gizzard Shad. Gizzard Shad consume a lot of resources and flood the ecosystem with forage, which reduces predation pressure on Bluegill. Gizzard Shad also commonly reduce recruitment of Largemouth Bass and other predators, which leads to higher survival of Bluegill as well.

If a higher quality Bluegill fishery is desired competition for resources must be lowered. This can be done by stocking predatory fish or through harvest by fishermen. In a lake of this size stocking will likely be required. Hybrid Striped Bass would be a great option in addition to the already present Largemouth Bass.

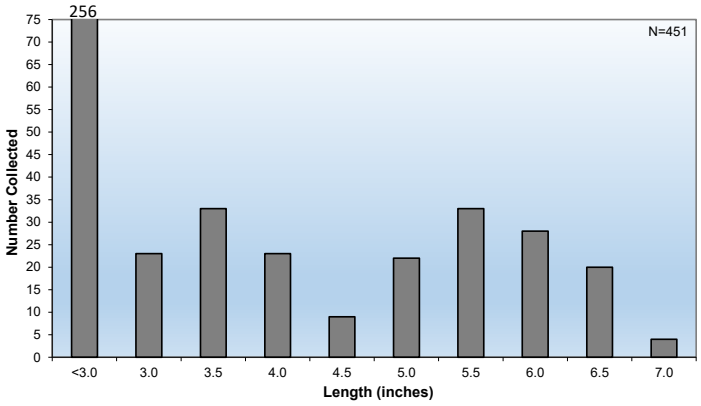

Figure 3. Length frequency distribution of Bluegill

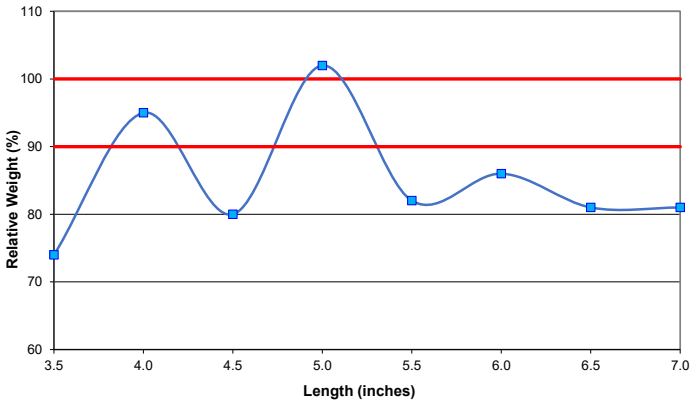

Figure 4. Bluegill relative weights

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Predator-Prey Relationship

Largemouth Bass are an opportunistic predator that will eat just about any species of fish they can catch. To keep a Largemouth Bass growing properly there needs to be several different sizes of forage available. This allows the bass to continually find the optimal size of prey as it continues to grow. When the optimal size of prey is available the fish can conserve energy, resulting in a higher growth rate. If the prey is too small a Largemouth Bass could potentially spend more energy chasing a meal than it gains by eating it. This results in skinny and slow growing fish. Managing a forage base to create a variety of sizes is key to creating a healthy and balanced Largemouth Bass population.

Lake woodland—Largemouth Bass

A total of 84 Largemouth Bass ranging in size from 4.0 to 19.5 inches was collected (Figure 5). Approximately 12% of Largemouth Bass were less than 8.0 inches in length. This indicates Largemouth Bass are having successful reproduction and recruitment. The majority of Largemouth Bass sampled were between 8.0 to 12.5 inches. This led to a PSD of 47 for Largemouth Bass, which is within the desired range of 40-60. Relative weights ranged from 78 to 122 (Figure 6). The majority of relative weights fell above the 90 mark. This is an indicator that most Largemouth Bass are finding enough food.

Largemouth Bass

Largemouth Bass had exceptional relative weights at the time of the survey. This is due to a very large forage base consisting of Bluegill, Redear Sunfish, Pumpkinseed Sunfish, and Gizzard Shad. Abundant forage not only provides the Largemouth Bass with huge quantities of food, but also can reduce Largemouth Bass recruitment. This ensures that competition for resources can remains low.

Despite the high level of forage, Largemouth Bass appear to be having some level of successful reproduction. This is evident with the young of year shown in figure 5. This is also evident from the increased catch rate from previous surveys. From 2016-2021 the catch rate increased from 25/hour to 84/hour. This increase in Largemouth Bass numbers and reproduction is likely due to the heavy supplemental stocking in 2017.

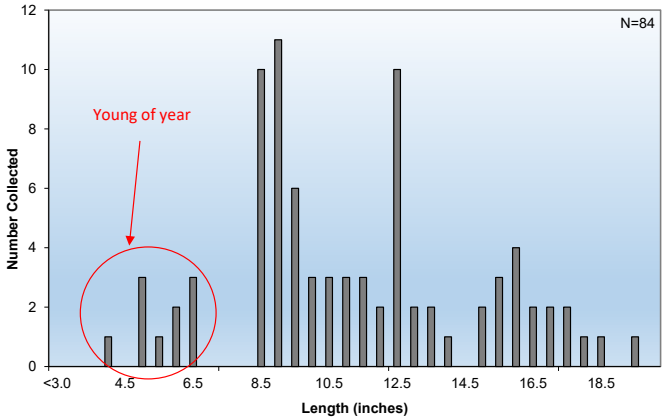

Figure 5. Length frequency distribution of Largemouth Bass

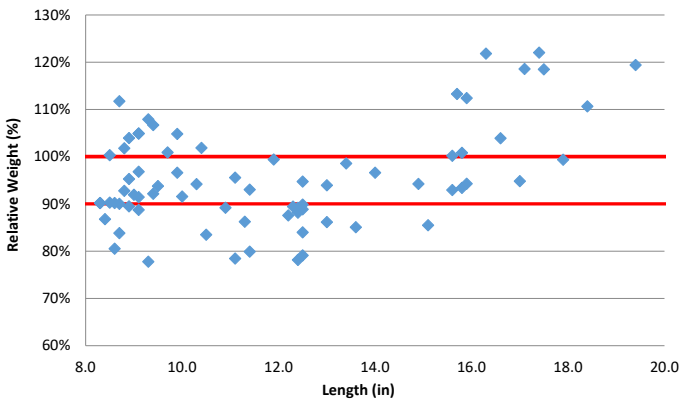

Figure 6. Largemouth Bass relative weights

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Bluegill Comparison

The Bluegill population at Lake Woodland has shifted towards less mid-sized Bluegill (Figure 7). PSD has increased from 15 (2016) up to 27 (2021). This increase is largely due to the drastic increase in the predator population. Bluegill survival has dropped, which has reduced the crowding in the 4.5-5.0 size classes. This reduction in survival has helped to increase relative weights in Bluegill (Figure 8) by reducing competition. Though less 7.0+ inch Bluegill were caught in 2021 than in 2016, there are signs that Bluegill growth rates could be increasing. Continually harvesting panfish and supplemental predator stockings should help to continue this trend.

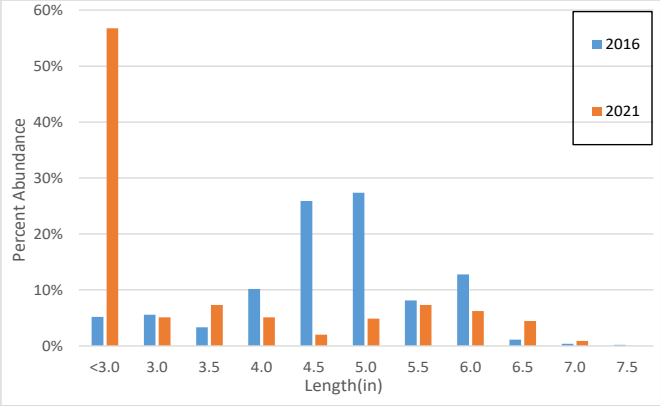

Figure 7. Bluegill length frequency comparison

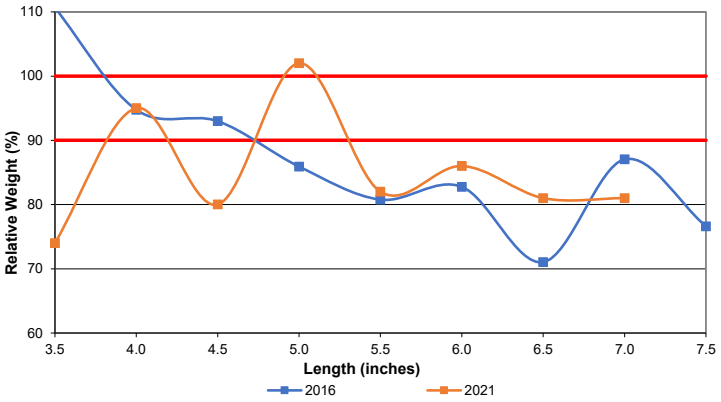

Figure 8. Bluegill relative weight comparison

Largemouth Bass Comparison

When comparing the 2016 Largemouth Bass data to 2021 Largemouth Bass the most striking difference is the overall catch rate. In 2016 the Largemouth Bass catch rate was 25 LMB/hr. In 2021 the catch rate more than tripled to 84 LMB/Hr. This is largely due to the supplemental predator stocking in 2017.

Largemouth Bass had a fairly balanced size distribution with representation across a large swath of size classes in both surveys (Figure 9). The 2021 data shows signs of continued recruitment with 12% of Largemouth Bass being <8.0inches in length.

Relative weight values do not appear to have changed much between surveys, despite the increase in predator populations. This is not surprising due to the extremely large forage base (Figure 10).

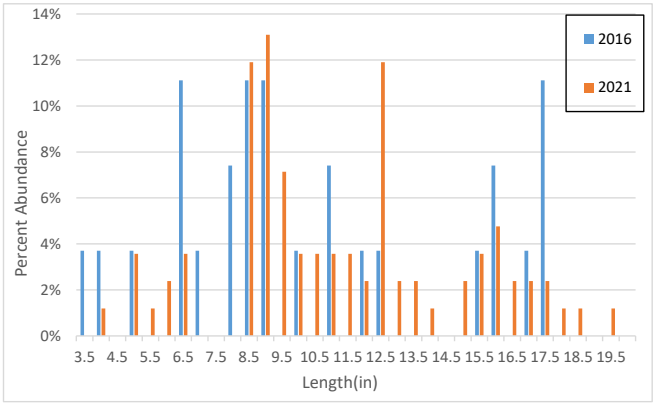

Figure 9. Length frequency distribution of Largemouth Bass

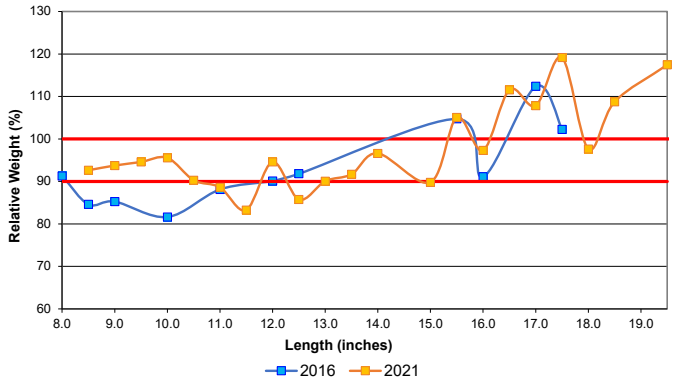

Figure 10. Largemouth Bass relative weights

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Predator-Prey Relationship (Gizzard Shad)

Gizzard Shad were also found in Lake Woodland. This is another commonly known forage species that can make up a large percentage of a predators diet when available at smaller sizes, but can often come with more negatives than positives. The first issue caused by Gizzard Shad is the reduction in recruitment. Gizzard Shad are a filter feeding species that consume large amounts of phytoplankton and zooplankton. Unfortunately, this is exactly what all larval fish eat as soon as they are hatched. When Gizzard Shad are in large abundances they can compete with these larval fish for food and greatly impact recruitment of species such as Largemouth Bass.

In some lakes Gizzard Shad can reproduce very quickly and grow extremely fast. These may sound like great attributes for a forage fish, but often times Gizzard Shad grow too large for Largemouth Bass to consume. While the juvenile size classes of Gizzard Shad are beneficial as forage, they provide no benefit at adult size classes and can have negative impacts on water quality. Without a large enough predator to consume them these fish will never transfer their biomass up the food chain into a more desirable fish. Due to these issues the Gizzard Shad population should be closely monitored and the following management options should be considered.

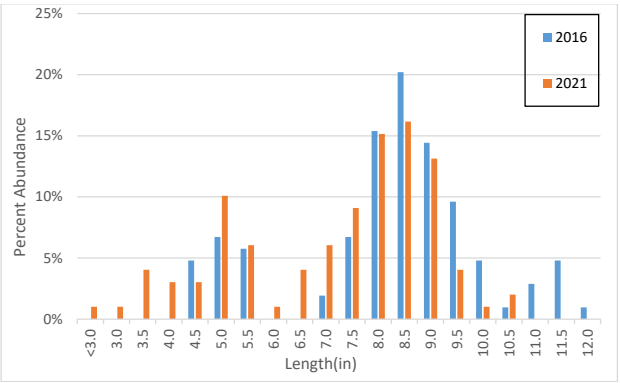

Figure 7. Length frequency distribution of Gizzard Shad

Gizzard Shad

Management Options

There are only a few options when trying to manage Gizzard Shad populations. One method is chemical eradication. This can be very costly on large lakes and results in dead fish throughout the lake. The other method commonly used to manage Gizzard Shad in impoundments is the supplemental stocking of large predators such as Hybrid Striped Bass or Muskellunge. By introducing a large apex predator some of the adult sized Gizzard Shad can then be consumed. This does not always improve the recruitment issue previously discussed, but it does provide an additional angling opportunity to the lake. If the Gizzard Shad population is large enough these stockings can be done with little to no impact on the existing Largemouth Bass fishery.

Lake Woodland Gizzard Shad

Catch rate and size distribution of Gizzard Shad has remained fairly consistent. In 2021 there was an uptick in <6.0 inch Gizzard Shad. This may be due to a large year class in 2021.

Stocking 100 6-8” Hybrid Striped Bass in each of the next three years will increase the predation pressure on Gizzard Shad. Additionally, stocking 15 Tiger Muskie in each of the next three years would introduce a predator that would be able to consume largest Gizzard Shad in the lake.

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Harvest

Harvesting fish is often one of the most important and under utilized management practices in a pond or lake. Harvesting, or culling, fish is simply the act of intentionally removing fish from a specific population to decrease competition among the remaining individuals. The culture of catch and release bass fishing started in the 1970's and still has a strong hold on fisherman today. There is a misconception that taking a fish out of a system will be detrimental to the population and if released someone could catch that fish again after it has "grown up." The reality is in some situations there is too much competition and the next time that fish is caught it could be the exact same size a year later. By removing that fish, and others, it leaves more food available for the remaining individuals to continue to grow each and every year.

Example of Stunted Largemouth Bass

Ponds and lakes can both become overrun with predators or prey. Each scenario presents a different set of problems. In a predator (Largemouth Bass) dominant system prey populations are decimated and the lack of food results in slow or stunted growth. In a prey (Bluegill) dominated system spawning and recruitment success of other species can be negatively impacted due to egg predation or direct competition with young-of-year fish, along with slow growth within the population.

Fixing these issues requires targeted annual harvest. In an unbalanced system generally only one species requires a heavy amount of the harvest, while in a balanced system fish should be removed from most populations to maintain a continuous level of growth.

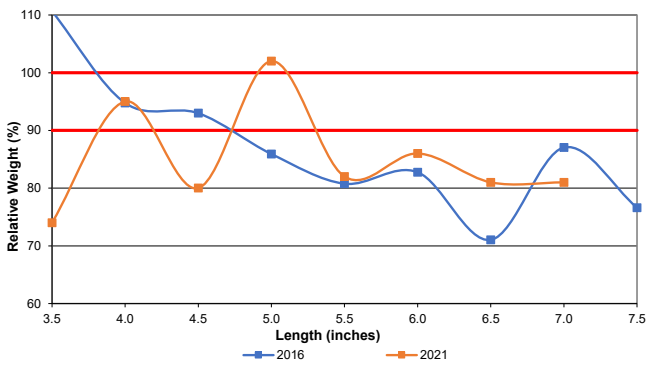

Figure 8. Bluegill Relative Weights.

Bluegill, Pumpkinseed Sunfish, Redear Sunfish, Black Crappie, and White Crappie are all species that can be harvested at this time. These species are either overabundant at this time or have a tendency to become overabundant. Increasing harvest on these species would help continue to improve overall growth rates (Figure 8).

Black and White Crappie do not appear to be extremely overabundant, but are prolific spawners and have a tendency to become overabundant. Allowing harvest of Crappie will help to maintain a quality Crappie fishery and continue to promote exceptional growth rates.

Common Carp and Gizzard Shad are both species that can cause a variety of issues in small impoundments including, Bluegill stunting, lowered recruitment in predators, and resuspension of nutrients into the water column. Anglers should remove these species whenever caught.

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Structure and Habitat

Structure and habitat are an extremely important factor to consider no matter what body of water is being managed. Just like anything else, the amount of structure in a lake should be kept in moderation. Too much or too little can lead to predictable scenarios. When very little or no structure is available Largemouth Bass spend too much time roaming around looking for food instead of saving energy and waiting near a piece of structure for food to swim by. The other end of the spectrum allows so many places for Bluegill or other prey species to hide that Largemouth Bass can't efficiently catch their prey. In both scenarios Largemouth Bass tend to have low relative weights even with proper harvest rates in place. In most cases roughly 20% of the shoreline containing structure is sufficient. This number can vary depending on the complexity of the cover.

Adding structure to a pond can be beneficial in a variety of ways. It can be a great way to increase the survival of small juvenile fish. This provides a forage base with a wide range of sizes available for your predators. Another benefit of adding structure to a pond is that they attract fish. Strategically placing structure can give you places that you can reliably catch fish.

Fish structure can take many different forms . Aquatic vegetation, brush piles, Christmas trees, and a variety of man-made structures can all be utilized by fish. All of these different structure types have different benefits that make them good management options. Aquatic vegetation

American Pondweed

Largemouth Bass utilizing a Mossback Root Wad Kit

grows on its own but can be hard to manage at times. Brush piles and Christmas trees are often free, but will break down over time and need to be replaced. Manufactured structure can be costly initially, but will last a lifetime. Variety is important when assessing structure in a body of water. Adding structures of varied complexity and in varied depth can help to provide habitat to a variety of fish at different stages of life.

The habitat plan for Lake Woodland will require three different forms of habitat: vegetation, woody structure, and artificial structure. Vegetative habitat should take the form of emergent vegetation planted at the inflow of the lake. These plants will be used to increase the overall amount of habitat, but will also sequester nutrients and help reduce the rate sediments enter the main basin of the lake.

Artificial structure should be the next highest priority. Artificial is preferred over natural because it will not break down, lose complexity, and will not introduce additional organic material into the lake. Artificial structure should initially be focused into four reefs that will be used as sanctuary habitat. Sinking 20-30 Christmas Trees or a comparable amount of woody structure every three years will also aide in increasing the overall amount of habitat in the lake. Detailed plan on page 14.

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Summary/Recommendations

Watershed/Water Quality:

Before investing time and money into the fishery at Lake Woodland, there are some important watershed/water quality considerations to take into account. Dredging is a very expensive option for any lake, and to our knowledge is all but ruled out as an option in the near-term. A more viable option may be to make some alterations to the inflow of the lake to manage the sediment and nutrient deposition. Digging out a section near the inflow and installing a rock wall could make a settling basin to catch sediments. As this basin fills you would potentially be able to dig it out with a backhoe, as opposed to having to dredge a whole basin of the lake. It would be important to establish plants on either side of the settling basin, in order to further slow sediments coming in. This is all food for thought, representatives from Woodland Springs HOA would need to meet with pond building/excavation companies to explore the viability of this option. Regardless of whether the settling basin is put in place planting at the inflow would be beneficial.

Another potential option for improving the fishery and potentially improving water quality is to reduce the rough fish population, specifically Gizzard Shad and Common Carp. Both of these fish are known to constantly resuspend sediments and nutrients, which can make for very robust planktonic blooms. Reducing both populations will help to reduce these blooms, which can help to reduce the chances of fish kills or the likelihood of a harmful/toxic algae bloom. This will by no means be a silver bullet, but has been shown to help in some cases. Removing Common Carp will likely need to be done by electrofishing, while Gizzard Shad can best be managed by a selective rotenone rate. The is a low rate of a piscicide used to kill fish that will almost exclusively kill Gizzard Shad. Removing Gizzard Shad by electrofishing is not a viable option to make any measurable impact on the population. Reducing the Gizzard Shad will also improve Largemouth Bass recruitment and Bluegill growth rates, potentially improving both fisheries. The primary drawback to selective rotenone is that it will not likely kill all Gizzard Shad, so they will likely rebound over time. This could mean periodically having to re-treat years later to knock back the population again. Another draw-back to selective rotenone would be the extensive clean-up effort unless the fish were left to sink and decompose on their own. Aquatic Control does not offer fish clean-up services following a rotenone treatment.

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Summary/Recommendations:

Lake Woodland appeared to be transitioning towards a more balanced state at the time of the survey. Largemouth Bass recruitment has seen a substantial increase since the previous survey due to a substantial predator stocking that took place in 2017. Supplemental Largemouth Bass stocking does not need to be done at this time as it appears that the population is rebounding successfully. If further utilizing Gizzard Shad is desired at this time, Hybrid Striped Bass would be the best option. Hybrid Striped Bass will focus much of their predation effort on Gizzard Shad as they are both pelagic species that spend their time in open water. Hybrid Striped Bass have also been found to predate on crappie and sunfish species, which will help to promote better individual growth in those species. Hybrid Striped Bass stockings should start in the fall of 2022 and be distributed out across 3 years. An additional species that could be stocked to target Gizzard Shad is Tiger Muskie. Tiger Muskie grow large enough to predate upon the largest Gizzard Shad in the population. At this time 8.0+" Gizzard Shad have very little predation pressure put on them because there are very few predators present large enough to eat them.

At this time Largemouth Bass do not need a high level of harvest, but this may change in the coming years as the Largemouth Bass population begins to rebound. At this time, a slot limit of 5 Largemouth Bass between 9.0-15.0 inches in length should be put into place. This will help to prevent crowding and can help continue to promote a quality Largemouth Bass fishery moving forward. Harvest of sunfish species can help to improve growth in Bluegill, Redear Sunfish, and Pumpkinseed Sunfish. Any Green Sunfish, Common Carp, Koi, or Gizzard Shad should be removed when caught. Aquatic Control can conduct Common Carp removals by use of electrofishing. This will ideally be done during the late Spring when Common Carp are spawning.

Shoreline vegetation should be strongly considered as an option to increase habitat in Lake Woodland. Increasing vegetation will not only improve habitat for fish, but also have some water quality benefits. Vegetation, especially at the inflow will help to slow sedimentation into the main basin and help to sequester nutrients. It should be noted that this could potentially reduce planktonic algae and increase water clarity, which will promote submersed weed growth. Additionally, sinking woody structure and installing artificial structure would be an effective means of increasing the overall amount of habitat. Woody structure should be limited to ~25% of the introduced structure because it can contribute to the already high nutrient levels. Woody structure can take the form of Christmas Trees, shrubs, or lay-downs. Artificial structure can be made or purchased and should be focused on making 4 large reef areas in 2022. These reefs will work as sanctuary and nursery habitat for fish. It will still make for a low level of overall structure but will help to stabilize the food web and increase growth rates in both predator and prey species. In the future additional artificial structure can be added to these reefs or additional reefs can be built. Page 14 of this report has a map showing a proposed habitat layout.

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Summary/Recommendations

The following recommendations, **listed in order of importance**, will help protect and enhance the fishery in Lake :

1. Plant emergent vegetation at inflow of lake (Consider settling basin).
2. Establish 4 artificial structure reef areas.
3. Sink 20-30 Christmas trees or comparable woody structure in non-swimming areas.
4. Stock 100 5-7” Hybrid Striped Bass for each of the next three years.
5. Bluegill Bag Limit: 40 Fish/Day.
6. Redear/Pumpkinseed Sunfish Bag limit: 20 Per day.
7. White/Black Crappie: No bag limit necessary.
8. Largemouth Bass slot limit: Keep 5 fish between 9.0 and 15.0 inches in length.
9. Conduct one Common Carp removal each spring (Electrofishing).
10. Encourage Lot-owners to install artificial habitats for near-shore fishing.
11. Consider stocking 15 tiger muskie in each of the next 3 years.
12. Conduct a Fisheries Analysis Survey in 2024 in order to monitor the effects of the above recommendations and assess needs for further management activities.
13. Remove any Green Sunfish, Common Carp, Koi, or Gizzard Shad when caught.

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Habitat Recommendation:

- Each planting section will have multiple species of plants which could include Arrowhead, Pickerel Weed, and Bull Rush.
- Deep water reef will consist of:
  - 5 Trophy Trees
  - 5 Safe Haven Kits
  - 2 Safe haven XL kits
- Shallow water reef will consist of:
  - 6 Rootwad Kits
  - 5 Rootwads
- Mixed Reef will consist of:
  - 3 Rootwad kits
  - 5 Rootwads
  - 4 Safe havens
  - 4 Trophy trees
- 20-30 Christmas trees and comparable woody structure can be dispersed throughout the rest of the lake.

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Pumpkinseed Sunfish (*Lepomis gibbosus*)

Pumpkinseed Sunfish is in the Centrarchidae (Sunfish) Family and had a relative abundance of 7.69% and made up 4.39% of the catch weight. Pumpkinseed Sunfish will eat small fish, crustaceans, and a variety of invertebrates and can compete with Bluegill for food resources. Pumpkinseed can be desirable in some situations because they grow to a large size and can be good table fare.

Pumpkinseed Sunfish

Redear Sunfish

Redear Sunfish (*Lepomis microlophus*)

Redear Sunfish are a member of the Centrarchidae(Sunfish) family and have a relative abundance of 3.52% and made up 3.19% of the catch weight. Redear Sunfish are not as fecund (reproductively successful) as Bluegill and rarely become overabundant. They can grow to large sizes and are regularly sought after by pan-fisherman. Redear Sunfish primarily feed on mollusks and invertebrates and have been shown in many cases to reduce levels of parasitism in fish populations.

Black Crappie (*Pomoxis nigromaculatus)*

Black Crappie are members of the Centrarchidae(Sunfish) family. Black Crappie had a relative abundance of 3.00% and made up 1.40% of the catch weight. Black Crappie can be difficult to manage in a pond ecosystem and in many cases are advised against in systems less than 10 acres. This is due to the tendency of Crappie ssp. becoming overabundant and stunted in smaller systems. In situations where Crappie are stocked, Black Crappie are usually the more advisable species due to lower reproduction in comparison to White Crappie. Black Crappie eat a variety of organisms while developing into adulthood, and then as adults tend to only eat small fish. Crappie ssp. tend to sit deeper in the water column and often do not show up well in electrofishing surveys.

Black Crappie

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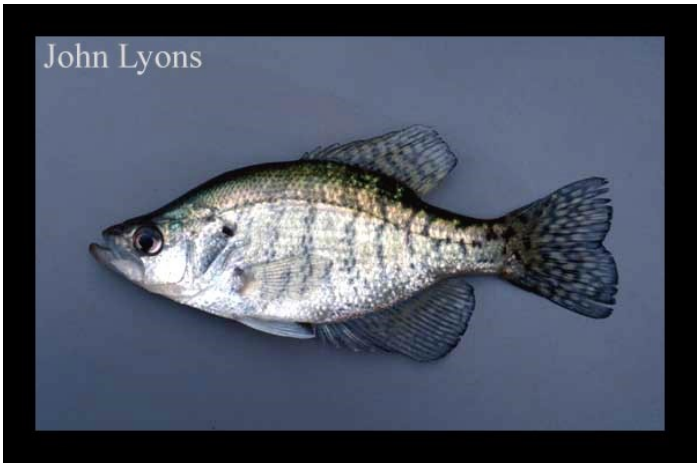
Other Species Present

White Crappie (Pomoxis annularis)

White Crappie are members of the Centrarchidae(Sunfish) family and were found to have a relative abundance of 0.78% and made up 1.17% of the catch weight. White Crappie are difficult to manage in a pond setting and are often advised against in systems that are less than 10 acres. This is due to Crappie ssp. tendency to become overabundant and stunted in smaller systems. In situations where Crappie are to be stocked into a smaller body of water, Black Crappie would be the preferred species because they tend to have a lower rate of reproduction. White Crappie eat a variety of organisms while developing into adulthood, and then as adults tend to only eat small fish. Crappie ssp. tend to sit deeper in the water column and often do not show up well in electrofishing surveys.



White Crappie

Common Carp

Common Carp/Koi (*Cyprinus carpio*)

Common Carp is in the Cyprinidae (Minnow) Family and had a relative abundance of 0.52% and made up 20.92% of the catch weight. Common Carp are a non-native, invasive species that can cause several problems. They consume a lot of food resources and tend to uproot aquatic vegetation, reducing water quality. Common Carp are also known to have detrimental effects on reproduction of many fish species by damaging spawning grounds. Common Carp should be removed when caught in order to reduce their impact on the fishery.

Brook Silverside (*Labidesthes sicculus*)

Brook Silverside is in the Atherinidae (Silverside) Family and had a relative abundance of 1.56% and made up 0.07% of the catch weight. Brook Silverside is a good baitfish species for Crappie ssp., Yellow Perch, and the juvenile stages of larger predator species.

Brooke Silverside

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Other Species Present

Green Sunfish

Green Sunfish *Lepomis Cyanellus*

Green Sunfish are a member of the Centrarchidae (Sunfish) family and were found to have a relative abundance of 0.13% and made up 0.07% of the catch weight. Green Sunfish can be aggressive and competitive with Bluegill and other species for food and resources therefore they are generally considered an undesirable species. Green Sunfish look superficially like Bluegill. They can easily be distinguished by their larger mouths and more rounded pectoral fins.

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Fish Collection Tables

SIZE GROUP (IN)	NUMBER	PERCENTAGE	AVERAGE WEIGHT (lbs.)	TOTAL WEIGHT (lbs.)	WS	RELATIVE WEIGHT
BLUEGILL						
<3.0	256	56.76%	0.0	2.56		
3.0	23	5.10%	0.02	0.46	0.02	-
3.5	33	7.32%	0.02	0.66	0.03	74
4.0	23	5.10%	0.04	0.92	0.04	95
4.5	9	2.00%	0.05	0.45	0.06	80
5.0	22	4.88%	0.09	1.98	0.09	102
5.5	33	7.32%	0.10	3.30	0.12	82
6.0	28	6.21%	0.14	3.92	0.16	86
6.5	20	4.43%	0.17	3.40	0.21	81
7.0	4	0.89%	0.22	0.88	0.27	81
TOTAL	451			18.53		
LARGEMOUTH BASS						
4.0	1	1.19%	0.04	0.04	0.03	-
5.0	3	3.57%	0.06	0.19	0.06	-
5.5	1	1.19%	0.07	0.07	0.07	-
6.0	2	2.38%	0.09	0.17	0.10	-
6.5	3	3.57%	0.13	0.38	0.13	-
8.5	10	11.90%	0.28	2.77	0.30	93
9.0	11	13.10%	0.34	3.79	0.36	94
9.5	6	7.14%	0.40	2.42	0.43	95
10.0	3	3.57%	0.48	1.44	0.50	96
10.5	3	3.57%	0.53	1.59	0.59	90
11.0	3	3.57%	0.60	1.81	0.68	89
11.5	3	3.57%	0.65	1.96	0.78	83
12.0	2	2.38%	0.85	1.70	0.90	95
12.5	10	11.90%	0.88	8.78	1.02	86
13.0	2	2.38%	1.05	2.09	1.16	90
13.5	2	2.38%	1.20	2.40	1.31	92
14.0	1	1.19%	1.42	1.42	1.47	97
15.0	2	2.38%	1.65	3.29	1.83	90
15.5	3	3.57%	2.14	6.41	2.03	105
16.0	4	4.76%	2.19	8.76	2.25	97
16.5	2	2.38%	2.77	5.54	2.48	112
17.0	2	2.38%	2.95	5.89	2.73	108
17.5	2	2.38%	3.57	7.14	3.00	119
18.0	1	1.19%	3.20	3.20	3.28	98
18.5	1	1.19%	3.89	3.89	3.58	109
19.5	1	1.19%	4.97	4.97	4.23	117
TOTAL	84			82.11		

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GIZZARD SHAD

<3.0	1	1.01%	0.01	0.01
3.0	1	1.01%	0.02	0.02
3.5	4	4.04%	0.02	0.08
4.0	3	3.03%	0.03	0.09
4.5	3	3.03%	0.03	0.09
5.0	10	10.10%	0.05	0.50
5.5	6	6.06%	0.06	0.36
6.0	1	1.01%	0.05	0.05
6.5	4	4.04%	0.05	0.20
7.0	6	6.06%	0.12	0.72
7.5	9	9.09%	0.16	1.44
8.0	15	15.15%	0.17	2.55
8.5	16	16.16%	0.21	3.36
9.0	13	13.13%	0.29	3.77
9.5	4	4.04%	0.35	1.40
10.0	1	1.01%	0.40	0.40
10.5	2	2.02%	0.47	0.94
TOTAL	99			15.98

PUMPKINSEED SUNFISH

4.0	14	23.73%	0.05	0.70
4.5	4	6.78%	0.05	0.20
5.5	9	15.25%	0.13	1.17
6.0	18	30.51%	0.17	3.06
6.5	10	16.95%	0.20	2.00
7.0	3	5.08%	0.26	0.78
8.0	1	1.69%	0.16	0.16
TOTAL	59			8.07

REDEAR SUNFISH

<3.0	2	7.41%	0.01	0.02
3.0	1	3.70%	0.03	0.03
3.5	1	3.70%	0.04	0.04
4.0	1	3.70%	0.03	0.03
5.0	1	3.70%	0.08	0.08
5.5	2	7.41%	0.11	0.22
7.0	5	18.52%	0.25	1.25
7.5	7	25.93%	0.27	1.89
8.0	7	25.93%	0.33	2.31
TOTAL	27			5.87

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BLACK CRAPPIE

3.0	2	8.70%	0.02	0.04
3.5	7	30.43%	0.02	0.14
4.0	2	8.70%	0.04	0.08
6.0	3	13.04%	0.12	0.36
7.0	3	13.04%	0.18	0.54
7.5	3	13.04%	0.21	0.63
8.0	3	13.04%	0.26	0.78
TOTAL	23			2.57

BROOK SILVERSIDE

<3.0	2	16.67%	0.01	0.02
3.0	4	33.33%	0.01	0.04
3.5	6	50.00%	0.01	0.06
TOTAL	12			0.12

WHITE CRAPPIE

6.0	1	16.67%	0.09	0.09
7.0	1	16.67%	0.13	0.13
8.5	3	50.00%	0.23	0.69
13.0	1	16.67%	1.20	1.24
TOTAL	6			2.15

COMMON CARP

24.0	1	25.00%	6.9	6.93
24.5	1	25.00%	8.5	8.45
27.0	1	25.00%	11.0	11.01
27.5	1	25.00%	12.1	12.07
TOTAL	4			38.46

GREEN SUNFISH

5.5	1	100.00%	0.12	0.12
TOTAL	1			0.12

KOI

27.5	1	100.00%	9.9	9.86
TOTAL	1			9.86

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Species	Scientific Name	N	%N	Size Range (in.)	Total weight (lbs.)	%Wt.	N/hr.
Bluegill	*Lepomis macrochirus*	451	58.80%	<3 - 7.0	18.53	10.08%	451
Gizzard Shad	*Dorosoma cepedianum*	99	12.91%	<3.0-10.5	15.98	8.69%	99
Largemouth Bass	*Micropterus salmoides*	84	10.95%	4.0 - 19.5	82.11	44.66%	84
Pumpkinseed Sunfish	*Lepomis gibbosus*	59	7.69%	4.0 - 8.0	8.07	4.39%	59
Redear Sunfish	*Lepomis microlophus*	27	3.52%	<3 - 8.0	5.87	3.19%	27
Black Crappie	*Pomoxis nigromaculatus*	23	3.00%	3.0-8.0	2.57	1.40%	23
Brook Silverside	*Labidesthes sicculus*	12	1.56%	<3.0-3.5	0.12	0.07%	12
White Crappie	*Pomoxis annularis*	6	0.78%	6.0-13.0	2.15	1.17%	6
Common Carp	*Cyprinus carpio*	4	0.52%	24 - 27.5	38.46	20.92%	4
Green Sunfish	*Lepomis cyanellus*	1	0.13%	5.5	0.12	0.07%	1
Koi	*Cyprinus rubrfuscus*	1	0.13%	27.5	9.86	5.36%	1
Total		767			183.84		

N = number of individuals
%N = percent number of a species as compared to the total number of fish collected
%Wt = percent weight of a species as compared to the total weight of all fish collected
N/hr. = catch rate of species (number of fish of a species collected per hour of electrofishing effort)